STATE OF ALASKA

William A. Egan, Governor

Annual Report of Performance for

SPORT FISH STUDIES

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations of Alaska.

Project No.: F - 9 - 6

Study No.: G - II Study Title: SPORT FISH STUDIES.

Job No.: G - II - H Job Title: Anadromous Fish Population Studies Matanuska-Susitna Valleys.

Period Covered: July 1, 1973 to June 30, 1974.

ABSTRACT

Chinook salmon, Oncorhynchus tshawytscha, escapement surveys were conducted on 21 streams from July 23 to August 3, 1973. With one exception, chinook escapements were substantially higher than indicated by comparable counts in prior years.

The reliability of aerial surveying was evaluated by comparing helicopter, fixed wing, and ground counts conducted on Montana and Willow creeks. The effectiveness of fixed-wing aircraft versus foot surveys ranged from 32%-63%, while helicopter surveys accounted for 58%-73% of the total number of chinook counted during foot surveys.

Foot surveys were conducted on six streams to estimate spawning coho salmon, O. kisutch, populations. Escapement counts on all streams were below the 1968-1972 averages.

Data are presented that indicate a direct correlation between years of low annual rainfall and reduced coho production in Fish Creek.

RECOMMENDATIONS

1. Continue enumeration of chinook and coho stocks and expand surveys to catalog and enumerate additional chinook and coho populations.

2. Enumeration of chinook populations should be conducted by helicopter on Little Willow Creek, Chunilna Creek, Little Susitna River, and the north fork of the Kashwitna River.

3. Evaluate returning marked chinook stocked in Willow Creek as smolts in 1971.

4. Continue operation of the Fish Creek weir to determine coho escapement.

OBJECTIVES

1. To investigate and evaluate population trends of anadromous fish species in the Matanuska Valley and east-side tributaries of the Susitna River and tributaries of the Chulitna and Talkeetna rivers.

2. Evaluate angling pressure on anadromous fish streams in the job area.

3. To make recommendations for proper management, and to direct the course of future studies relating to anadromous fishes within the job area.

TECHNIQUES USED

Chinook spawning populations were enumerated by aerial, boat and streambank surveys. Aerial surveys were conducted on all clearwater streams in the study area to determine the presence of spawning chinook.

The reliability of aerial surveys was evaluated by comparing ground, PA-18 Supercub, and Bell 45 Helicopter escapement counts on Montana and Willow creeks. These comparison counts were conducted during a two-day period on selected sections of the two streams.

Chinook carcasses were measured for fork length and examined for sex composition.

Coho spawning populations were enumerated by foot surveys within established index areas. Additional streams were surveyed to locate coho populations of sufficient size to establish new index areas.

A new temporary weir was located on Fish Creek immediately downstream from the Goose Bay-Wasilla Highway culvert. The weir was operated from July 1 through September 6 to enumerate all salmon species entering the Fish Creek system. The weir was built by Commercial Fish Division personnel and was constructed primarily of five-foot lengths of 1-1/8 inch diameter aluminum conduit spaced 1-1/2 inches apart. Salmon were identified by species and enumerated as they passed through a 5x5-foot trap built into the weir fence. Scales and fork lengths were recorded from captured coho.

FINDINGS

Chinook Studies

Escapement surveys were conducted from July 23 to August 3 in the Matanuska and Susitna valleys. All surveyed streams were clear and water levels were below normal, which resulted in excellent counting conditions throughout the survey period. A total of 8,100 chinook salmon, Oncorhynchus tshawytscha, were actually observed during escapement surveys.

With the exception of Byers Creek, all surveyed streams revealed 1973 escapements were substantially higher than in 1972 (Table 1). Since all prior aerial surveys were completed with fixed wing aircraft, helicopter counts conducted in 1973 are not comparable to escapement data collected during previous years. Comparable fixed wing aerial surveys were conducted on eight streams in 1972 and 1973 which resulted in total escapement counts of 437 and 1,338 chinook, respectively.

The 1973 chinook escapement counts in Willow and Montana creeks were 190 and 175% greater, respectively, than for the previous four-year average. Escapement data on these streams have been collected by foot counts since 1969.

It appears Prairie Creek is one of the major chinook producing streams in the Susitna River drainage. In 1973, a foot count of the entire stream revealed an escapement of 4,190 chinook. During the surveys, biological data were collected from chinook carcasses. A sample of 210 chinook were measured for size composition. The salmon ranged in length from 34 to 132 cm, with a mean of 102 cm. Males and females averaged 102 and 103 cm, respectively. Sex ratio of males to females was 0.8:1.

Aerial surveys were conducted on numerous clearwater tributaries of the Talkeetna, Chulitna, and Tokositna rivers not known to contain chinook. During these reconnaisance surveys, spawning chinook populations were located in three streams: Bunco Creek, Disappointment Creek, and Chulitna River (east and middle forks).

Willow and Montana creeks were selected for comparisons of foot, helicopter, and fixed wing counts. The results of these comparisons are presented in Table 2. The effectiveness of fixed wing aircraft versus foot surveys ranged from 32% - 63% while helicopter surveys accounted for 58% - 73% of the total number of chinook counted by foot surveys. The lower success rates on the south and middle forks of Montana Creek was not unexpected since these forks are small and meander through densely forested areas. Because of it's maneuverability and ability to fly at low speeds, the helicopter had a definite advantage over fixed wing aircraft on these small tributaries.

Table 3 shows comparisons between fixed wing and helicopter surveys. The effectiveness of fixed wing versus helicopter surveys ranged from a low of 51% to a high of 98%. Typically, streams flowing through alpine areas are much easier to survey than those winding through heavily forested areas. Fixed wing aircraft are nearly as effective as helicopters on alpine streams, while the helicopter is much more efficient on smaller streams flowing through forested areas.

TABLE 1. Observed Chinook Escapement Counts, Susitna and Matanuska River Tributaries, 1969-1973.

	Fixed Wing Aerial Surveys					Helicopter Surveys
	1969	1970	1971	1972	1973	1973
Sheep Creek	---	---	---	101	444	482
Little Willow Creek	---	45*	---	99	233	371
Kashwitna R. (No. Fork)	0	---	1	31	145	183
Chunilna Creek	375	58*	5*	91	245	292
Byers Creek	---	---	3	7	1	---
Troublesome Cr.	---	---	5	5	7	---
Indian River	---	---	---	35	110	122
Portage Creek	---	---	---	68	153	174
Chulitna River (East Fork)	---	---	---	---	41	42
Chulitna River (Middle Fork)	---	---	---	---	206	219
Bunco Creek	---	---	---	---	34	---
Honolulu Creek	---	---	---	---	17	---
Pass Creek	---	---	---	---	8	---
Disappointment Cr.	---	---	---	---	20	---
Granite Creek	---	---	---	---	4	---
Kings River	---	---	---	---	1	---
Prairie Creek	---	820	---	630	---	3,286
Little Susitna River	---	---	---	---	---	374
	Ground Surveys					
Willow Creek	290	640	165	370	1,074	
Montana Creek	150	261	44	317	527	
Moose Creek	---	126	40	21	36	
Prairie Creek	---	---	---	---	4,190	

*Poor Conditions

TABLE 2. Relative Effectiveness of Aerial and Foot Chinook Surveys on Susitna River Tributaries, 1973.

Stream	% Success of Fixed Wing vs. Foot Surveys	% Success of Helicopter vs. Foot Surveys
Willow Creek	678/1,074 = 63	771/1,074 = 72
Montana Creek		
(Main Stem)	160/306 = 52	223/306 = 73
(South Fork)	20/50 = 40	29/50 = 58
(Middle Fork)	45/140 = 32	89/140 = 64

TABLE 3. Relative Effectiveness of Fixed Wing and Helicopter Chinook Surveys on Susitna River Tributaries, 1973.

Stream	% Success of Fixed Wing vs. Helicopter Surveys
Sheep Creek	444/482 = 92
Little Willow Creek	233/371 = 63
Kashwitna (North Fork)	145/183 = 79
Chunilna Creek	245/292 = 84
Portage Creek	153/174 = 88
Indian River	110/122 = 90
Chulitna River (East Fork)	41/42 = 98
Chulitna River (Middle Fork)	206/219 = 94
Willow Creek	678/771 = 88
Montana Creek (Main Stem)	160/223 = 72
(South Fork)	20/29 = 69
(Middle Fork)	45/89 = 51

Since the effectiveness of fixed wing aircraft was substantiated on several types of streams it was possible to calculate the probable number of chinook in each stream. A total of 5,827 chinook were observed during ground surveys on four streams and 2,259 chinook were counted in those streams surveyed by fixed wing aircraft. Assuming 70% of the chinook were observed in alpine streams and 55% were observed in streams flowing through heavily forested areas, it was estimated that the escapement in streams aerially surveyed was 3,069 chinook. Combined ground and expanded aerial counts revealed a total escapement of 8,900 chinook in the survey area.

Coho Studies

Foot surveys were conducted on six streams to estimate spawning coho salmon, O. kisutch, populations.

A summary of coho escapement counts in index areas is presented in Table 4. The 1973 escapement counts on all streams were below the 1968-1972 averages. Counting conditions were excellent on all streams. An additional index area was established on Question Creek which crosses the Talkeetna Spur Road.

TABLE 4. Numbers of Coho in Escapement Index Areas (Foot Counts), Upper Cook Inlet, 1968-1973.

	1968	1969	1970	1971	1972	1973	Average 1968-72
Wasilla Creek	---	---	101	104	19	28	75
Cottonwood Creek	22	9	5	29	21	10	17
Birch Creek	125	142	206	138	69	106	136
Fish Creek	35*	852	176	141**	118	75	264
Meadow Creek	54	109	49	9	27	14	50
Question Creek	---	---	---	---	---	59	---
TOTAL	236	1,112	537	421	254	292	

* Count Made after peak of spawning.
**Due to high water a boat count was necessary.

In 1973, a total of 210 coho were enumerated through the Fish Creek weir between July 22 and September 6. Forty-five of these fish were checked for age, length, and sex composition. The age structure of the escapement was entirely comprised of age 2.1 fish. The mean length (mid-eye to fork of tail) was 519 mm (range 420-600 mm). Sex ratio of males to females was 1.1:1.

Salmon escapements into Fish Creek have been enumerated almost every year since 1936. During this period there has been only one year (1953) when coho escapement was lower than in 1973. Post records show coho runs into Fish Creek have reached levels as high as 19,000 fish, and runs of 2,000 to

4,000 coho were not uncommon. A marked decline in coho escapements began in 1971 and continued in 1972 and 1973 (Table 5). These three years of low escapement are the progeny of the 1967-1969 brood stock. Escapements during the years 1967-1969 were excellent. In 1967 and 1968, coho counts were 984 and 2,088, respectively, even though the count terminated on July 31. The bulk of the coho escapement normally enters the system in August.

TABLE 5. Fish Creek Coho Escapement Counts and Cook Inlet Commercial Coho Harvest, 1968-1973.

Year	Method of Enumeration	Dates of Operation	Numbers	Cook Inlet Commercial Harvest
1967	Counting Screen	7/3-7/31*	984	180,161
1968	Counting Screen	7/1-7/31*	2,088	473,780
1969	Weir	7/4-9/ 2	4,253	100,979
1970	Weir	7/4-8/ 8**	1,048	276,078
1971	Weir	7/3-8/ 7**	583	97,457
1972	Weir	7/2-9/ 8	709	82,566
1973	Weir	7/1-9/ 6	210	86,014

* Weir was pulled out before coho run was complete.
** Weir was washed out by high water.

A study by Smoker (1955), in western Washington revealed precipitation and stream flows had a definite effect on coho production in that area. Precipitation data were obtained for the Palmer and Talkeetna areas for the years 1943-1972 (Table 6). Upon comparing this data with coho escapement counts from Fish Creek it appears there is a direct correlation between low precipitation years and reduced coho production. There were only two years (1946 and 1950) when annual rainfall in the Palmer area was equal to or lower than during the years 1968-1970, which were considered drought years. It appears that these dry years may have had a devastating effect on the coho population in Fish Creek since returns from the parent years 1967-1969 were extremely poor. It was also noted that precipitation in the Talkeetna area in 1968-1969 was the lowest recorded since 1943, the first year complete records were available. These dry years appear to be widespread and may have had an adverse effect on coho populations in all streams of Upper Cook Inlet.

TABLE 6. Average Annual Precipitation (Inches), Palmer and Talkeetna Areas, 1943-1972.

	Palmer	Talkeetna		Palmer	Talkeetna
1943	19.2	30.5	1958	13.1	22.6
1944	24.3	34.3	1959	22.4	23.2
1945	18.1	34.5	1960	18.5	25.8
1946	11.9	40.0	1961	20.4	26.8
1947	13.6	34.9	1962	13.3	26.6
1948	15.4	33.7	1963	16.3	45.0
1949	21.1	27.1	1964	15.5	27.2
1950	9.1	20.0	1965	15.5	30.6
1951	19.4	32.0	1966	12.2	32.6
1952	18.6	27.4	1967	18.4	38.8
1953	13.7	23.5	1968	11.0	18.4
1954	13.9	28.2	1969	10.9	15.5
1955	16.2	31.9	1970	11.9	32.5
1956	18.6	25.4	1971	14.5	31.2
1957	17.6	22.8	1972	14.3	27.8

Average precipitation (Palmer) 1943-1972, 16 inches.
Average precipitation (Talkeetna) 1943-1972, 29 inches.

As previously noted, precipitation during the year 1950 was the lowest recorded during the 1943-1972 period in the Palmer area, and was also one of the lowest precipitation years in Talkeetna. Coho escapements into Fish Creek were 277 and 71 in 1952 and 1953, respectively. Prior to 1973 these were the two lowest escapements recorded in Fish Creek. It appears that the low precipitation in 1950 may have had an adverse effect on the two-year classes residing in the system during 1950.

The Cook Inlet commercial coho harvest also declined substantially during the 1971-1973 period (Table 5). The commercial coho catch in 1972 was the lowest since 1951, the first year complete records were available, yet the harvest in 1968, the parent year of the 1972 population, was the highest on record. Commercial harvests, although a useful index of run strength, cannot be directly compared from year to year because of unmeasured fluctuations in fishing time and effort.

Coho escapements during the next several years are expected to be extremely poor as a result of poor escapements during the past three years.

The weir on Fish Creek has allowed index area escapement counts on Fish and Meadow creeks to be evaluated against a known escapement. The Fish Creek index area count of 75 coho represents 35.7% of the run entering the Big Lake system. In 1969 and 1972, this index area accounted for 20.1% and 16.5%, respectively, of the run. A total of 14 coho were enumerated in the Meadow Creek index area which represents 6.7% of the run, whereas in 1969 and 1972 only 2.6% and 3.8%, respectively, of the run was accounted for in

this index area. In 1969 and 1972, the Meadow and Fish creek index areas (combined), accounted for 22.7% and 20.3%, respectively, of the run passing through the Fish Creek weir. In 1973, the same index areas accounted for 42.4% of the total run. It is believed that the high percentage counted in the index areas in 1973 is related to the extremely low escapement. The index areas are thought to be located on optimum spawning areas. As the population decreases there may be a tendency for a higher percentage of the population to utilize the spawning grounds in the index areas.

LITERATURE CITED

Smoker, William A. 1955. Effects of Stream Flow on Silver Salmon Production in Western Washington. Ph. D. Thesis, University of Washington, Seattle. 175 pp.

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